

ISSUE 201

Fall 2022

## PCS Fall Tour: D&H Gravity Railroad



In October PCS members toured the D&H Gravity Railroad. The weekend began Friday with the Early Bird Tour which included a stop at Lock 31 Park in Hawley. For an article and photos from the tour, turn to page 4.

Photo by Doug Logan

To see what's inside this issue of *Canal Currents*, turn to page 2.



*Canal Currents* is published quarterly by the  
Pennsylvania Canal Society for its members.

Newsletter submissions may be sent to:

Cathy L. Snyder Houser - Editor [canalcurrents@gmail.com](mailto:canalcurrents@gmail.com)

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Pennsylvania Canal Society

National Canal Museum

2750 Hugh Moore Park Road

Easton, PA 18042

[www.pacanalsociety.org](http://www.pacanalsociety.org)

The Pennsylvania Canal Society is a non-profit, educational organization. The purpose of the Society is to preserve and transmit the rich heritage of canal transport in Pennsylvania. To attain these objectives, the Society:

- supports the National Canal Museum and library at Easton, Pa.;
- conducts tours of canal sites in Pennsylvania and other states;
- encourages canal research, conducted in libraries and/or by means of explorations in the field;
- makes available to the public the Society's collection of books, pictures and documents pertaining to the construction and operation of canals;
- publishes *CANAL CURRENTS*, a journal of articles detailing the research and field activities of persons interested in canals;
- provides members to present illustrated lectures and conduct tours for non-profit groups and schools.

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## MEMBERSHIP FORM

Members: If you don't keep your *Canal Currents*, please pass it along to someone who's not a member. Not a member? Here's how to join:

Name \_\_\_\_\_

(Title: Mr., Mrs., Ms., Dr., etc.) First MI Last

Address: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Student \$18, Individual \$20, Dual (using same address) \$25

This form and other dues classifications available online at:

<http://pacanalsociety.org/membership.htm>

Checks payable to the Pennsylvania Canal Society and mailed to:

PA Canal Society

2750 Hugh Moore Park Road

Easton, PA 18042



# A letter from the President



As I promised in my letter back in Issue 199, Spring 2022, we've brought back an article by Terry Woods from 1976 (see page 7). The western end of the state does not have a lot of canal remains and his article helps explain why. The Western Division of the Main Line was abandoned early in the life of the Pennsylvania Railroad, which bought the Main Line from the state in 1857.

Our Fall Tour went well and was well received. I've heard from several people who really appreciated it. We thank all those folks involved who assisted with the tour and welcomed us at their museums or gave permission and guided us to remains on their property (see related article on page 5). We couldn't have done it without you!

Our break-even count was more than met, and while we needed another van, we still came out ahead, which balanced out a small loss from our Spring Tour. The Treasurer's Report is still being reviewed but it looks like we're in the black for 2022.

At the Board of Directors meeting, the officers were re-elected, and a new printing and mailing service was approved. The new glossy look of *Canal Currents* is a result of that change.

We don't have any tours scheduled yet for 2023 but we're working on it. The Fall Tour took up a lot of time, some of which would normally be spent on planning. As always, I hope to see you soon!

Doug Logan

[PaCanals.info@gmail.com](mailto:PaCanals.info@gmail.com) 610-955-6436 (text me or leave a voice message)

## New Museum highlights the D&H Canal

By Linda Barth

(This article is condensed from ACS' *American Canals*, Vol. LI No.3, p. 15)

New York's Hudson River Valley has an exciting new attraction: the Delaware and Hudson Canal Museum. Notably the museum also houses the Mid-Hudson Visitor Center in High Falls, N.Y. In 2015 the D&H Canal Historical Society purchased the 1797 DePuy Tavern, which had been a four-star restaurant for decades.

To tell the story of the D&H Canal, the museum's designers created interactive exhibits that can be touched and explored. These include a working lock model with a mirror above that allows visitors to view the lock from a different perspective and a doorbell that allows you to listen to an excerpt of a speech.

On one panel, the visitor drags a torch that causes an explosive sound, mimicking a blasting experience that could result in different outcomes.

This museum is based on the formulas of Washington, D.C.'s Holocaust Memorial Museum and the Smithsonian's Museum of African American History and Culture. The visitor center, in the former kitchen of the tavern, features murals highlighting key sites, a carefully curated brochure rack, a gift shop, and an interactive digital concierge system. These amenities enable visitors to quickly access key information to plan visits in the Mid-Hudson area.



The former 1797 DePuy Tavern, now the Delaware and Hudson Canal Museum, and the Mid-Hudson Visitor Center.

Photo from D&H Canal museum website [www.canalmuseum.org](http://www.canalmuseum.org)

Located at 1315 Main Street, High Falls, NY 12440, the museum is open every day 10 a.m. to 5 p.m. Admission is free, but donations are always appreciated. For more information and for fall/winter hours, please visit or contact the museum at 845-687-2000 or [www.canalmuseum.org](http://www.canalmuseum.org).



# PCS Fall Tour:

## D&H Gravity Railroad

*By Doug Logan*

For our Friday Early Bird Tour all but a few of our group of canallers had arrived. We loaded into the vans and headed for Hawley. After a short drive we arrived at Lock 31 Park and were greeted by the sight of a canal boat sitting in the basin above the lock. It was a very recently built mockup that is full-size. It's constructed over a pavilion built earlier that has a glassed-in example of a canal boat cabin and its contents. Sally Talaga gave us a tour of the mockup and pavilion, followed by a walk to Lock 31. Due to occupancy restrictions for Daniels Farmhouse, we weren't able to go inside, but Talaga described it for us. It was built shortly before the canal and served as a way-stop, offering rooms, meals, spirits, and a second story dance hall.

When we returned to Ladore, Dr. S. Robert Powell joined us for dinner, and showed several D&H Gravity Railroad videos and talked about Saturday's tour.

After breakfast, we again loaded into the vans for the Saturday Tour, which began at the towering Carbondale City Hall where we were greeted by Dr. Powell. We climbed the old stairs to third floor Carbondale Historical Society Museum which has

(Continued on Page 6)



Above: Friday's Early Bird Tour began in Hawley at Lock 31 Park which features a full-size mock canal boat built over a pavilion.

Left: Saturday's tour began at Carbondale City Hall to visit the Carbondale Historical Society Museum.

Below: Saturday morning included a stop at the D&H Gravity Depot and Gravity Passenger Car.

Photos by Bob Barth (above) and Doug Logan





# *D&H Gravity Railroad: The People Who Made the Tour Possible*

By Doug Logan

I reflect now and then, quietly in awe of all the efforts of all the great people who made our tours successful. Our gratitude this time goes to a spectacular list of people who made this one possible.

First and foremost, we thank Dr. S. Robert Powell who is president of the Carbondale Historical Society and Museum. Dr. Powell gave us the presentations on the gravity railroad on Friday and Saturday night and served as a wonderful guide on the Saturday tour. He also contacted the Bennett's and obtained permission for us to visit Plane No. 14.

We thank Jane Varcoe who runs the Waymart Area Historical Society and the D&H Gravity Depot Museum, which has a gravity passenger car outside the depot. Jane was extremely helpful during our planning trips when we saw the *Depot Open* sign and stopped in. She was instrumental in getting our planning off to a great start and immediately arranged for lunch with Dr. Powell.

During our scouting, we met Carol Dunn at Lock 31 Park, which has a canal basin in addition to Lock 31, the Daniels Farmhouse, and walking trails. Carol is executive director of Wayne County Historical Society (WCHS) and in addition to personally giving the tour of the main museum in Honesdale on Saturday afternoon, she made arrangements for all three days of our tours at WCHS museums and put us in touch with the Frei's, making arrangements for our Sunday visit. Thank you, Carol.

Thanks go to Sally Talaga who was also at Lock 31 Park working on the Daniels Farmhouse during our scouting. She's the previous executive director of WCHS, and she gave us a delightful Friday Early Bird Tour and explained about the new structure that greeted us when we arrived at the park.

We were thrilled to be able to visit with Scott and Paula Bennett who showed us around their property and light Plane No. 14, and the engine mount at the top. Thank you for allowing us to visit and for showing us around.

Thanks to Stan Pratt who gave us a most interesting Sunday morning talk and tour of the Honesdale Fire Museum, which has the restored and working Silsby



Many people helped make the Fall Tour possible. On Sunday, John and Cathy Frei welcomed visitors to Lock House # 22 and Locks 22 and 23 at the Narrows of the Lackawaxen.

Photo by Doug Logan

Steam Fire Engine #483 purchased in early 1875.

John and Cathy Frei get a special thanks. They were contacted about a week before the tour and were more than gracious in allowing us to visit Lock House # 22, as well as guiding us to Locks 22 & 23 and the remains of the huge towpath wall at the "Narrows" on the Lackawaxen. John also made delicious chocolate chip cookies for us and bagged them up beautifully in a basket.

One more thank-you goes to Mike and Mary Riley, who went above and beyond, cutting their vacation plans short to drive our second van, when the person slated to drive had to bow out on short notice.

If you want to dig deeper on the Gravity Railroad, Dr. Powell has published 28 books on DVD related to the D&H and the Gravity Railroad, which you can buy through CHS ([carbondalepahistorical.org/shop](http://carbondalepahistorical.org/shop)). He also has a host of books and articles that you can obtain from the Internet Archive, a non-profit library of free material. To get started go to [archive.org](http://archive.org), enter *D&H Canal Company* for your search, check "Search text contents" and click "GO." Many of the 1600+ texts returned will be by Dr. Powell.

Thank you all so much!



# PCS Fall Tour: D&H Gravity Railroad



Above: Scott Bennet and Dr. Powell at Plane No. 14.



Top right: The Stourbridge Lion at Wayne County Historical Society Museum.

Bottom right: The Honesdale Fire Museum Engine 3.

Photos by Doug Logan and Bob Barth (top right)

## From Page 4

many things that made life special in Carbondale, including D&H Gravity Railroad artifacts. Dr. Powell gave us a great tour of the three rooms that make up the museum. From there he directed us past the monument to America's First Underground Anthracite Mine, on our way to Gravity Park. The park was established by the D&H Company on a portion of Plane No. 1. Dr. Powell walked with us from the parking lot and talked about Plane No. 1 and its role in Carbondale history.

On our way to Waymart, Dr. Powell pointed out the route and location of several planes as we drove up and over Moosic Mountain. Jane Varcoe greeted us at the Gravity Depot in Waymart and told us about the town's name and the depot, then gave us a tour and ran a working model layout of a gravity plane.

We stopped back at Ladore for lunch and afterward headed for Plane No. 14, owned by Scott and Paula Bennett. Scott showed us a piece of old steel cable used on the plane and took us up to the top and the stone mount remains for a stationary steam engine. The mount was enclosed by stone walls and all were in incredibly good condition. The winding wheel, steam engine, and boiler would all have been located there. Other nearby stone walls were a bit of a mystery as to what they once supported. The loaded gravity track, between Plane No. 12 and Honesdale, crossed over No. 14 near what's now the top of the driveway. At one time No. 14 was water-powered, from the bottom where the water was, rather than the top of plane.

The old D&H Canal Company Office in Honesdale is now Wayne County Historical Society's Main Museum and was our last Saturday stop. We were greeted by Executive Director Carol Dunn who gave us a tour that included



a full-size working replica of the Stourbridge Lion built by the D&H Shops in 1932, and a D&H gravity passenger car. There were also several small models of the Lion, including one that could be operated, so you could see how the early grasshopper propulsion arrangement worked.

After supper at Ladore, we had a brief membership meeting in which the four incumbent board members were elected, and acceptance of the Treasurer's Reports for 2020 and 2021 was deferred to the board. After the meeting, Dr. Powell talked about some pictures he brought with him including some of unusual gravestones brought by Welsh immigrants. When they were brought to the U.S. by the D&H as mining experts and engineers, they knew it was unlikely that they would ever return to Wales. They were proud of their Welsh identity and it was reflected in the inscriptions on the stones. Not surprisingly, Dr. Powell has some Welsh in his family history.

After breakfast, about half the group stayed on for

(Continued on Page 8)



## FRENCH CREEK FEEDER

By TERRY K. WOODS

This article was published in  
*Canal Currents* Issue 34, Spring 1976

The State of Pennsylvania, on Feb. 25, 1826, passed an act authorizing "the commencement of a canal to be known as 'The Pennsylvania Canal' and to be constructed at the expense of the state." This canal was to be part of a transportation system that would eventually connect Philadelphia, Pittsburgh and Lake Erie.

Initially, though, the "Act of 1826" empowered the Canal Commissioners to immediately begin construction of the canal at only three points: first, along the Susquehanna River from Swatara Creek to the Juniata River; second, along the Allegheny River from Pittsburgh to the Kiskiminetas River; and third, down French Creek connecting Conneaut Lake, Meadville and Franklin.

Originally, the north-south leg of the Pennsylvania Canal was to have left the Western Division near the junction of the Kiskiminetas and Allegheny River (Freeport), run northward along the Allegheny to Franklin, then up French Creek to Meadville and from there around Conneaut Lake to Erie. The canal we know as the French Creek Feeder was actually to have been part of the main canal to Lake Erie. And it was with this knowledge in mind that the citizens of Meadville and surrounding area set out to hold a "ground breaking" ceremony for the beginning of their canal to the lucrative eastern markets.

At ten o'clock in the morning of Aug. 27, 1827 the citizens of Meadville formed into a procession and marched away from the village "Diamond" to the booming of a cannon from Captain J.D. Torbett's company of artillery, peals from the borough's church bells and strains of patriotic music from the local brass band.

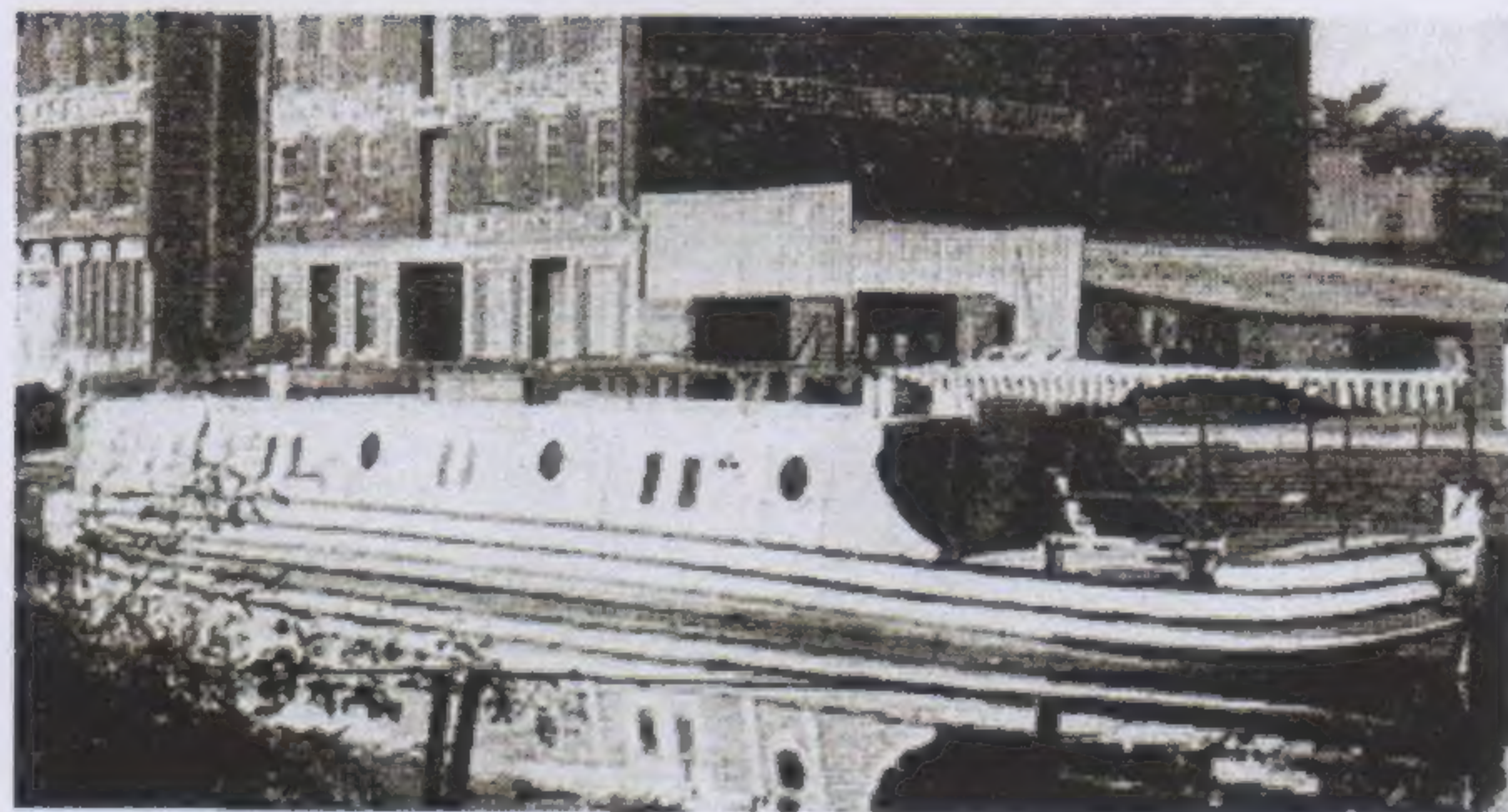
The procession wended its way through the streets of Meadville until it came to a point on French Creek opposite the then residence of A.C. Huidekoper. Here, Reverend Timothy Alden offered a prayer and delivered a stirring address. Then followed the official "breaking of the ground" which was performed by two of the area's early settlers—Robert Fitz Randolph, nearly 90 years old at the time, and Cornelius Van Horne, then over 80.

A team and plow were produced to break up the earth, followed by eight laborers who shoveled several wheelbarrow loads of earth and wheeled them away. While all this was going on the crowd cheered mightily and the artillery cannon banged out a 13 round "salute." The procession then reformed and marched back to town for a cold lunch and many, many toasts.

The "Meadville Canal" began at Bemus' Mill, about 2 ½ miles north of Meadville in French Creek. It then ran down the east side of that creek to near the mouth of the Conneaut Lake outlet. Here, the canal crossed French Creek on a stone aqueduct then ran south and west in a somewhat circular route and followed the Conneaut outlet, on the north side, to Conneaut Lake itself—a total distance of 27 miles. The State also constructed a 22 mile canal along French Creek from Bemus' Mill to Franklin.

The aqueduct over French Creek wasn't completed until 1830, but the citizens of Meadville had grown

impatient and celebrated the "opening" of navigation on "their" canal more than a year before! On Nov. 28, 1829 two large flatboats were launched at Lord's Basin just above Meadville. One, the *Enterprise*, was fitted up suitably to haul a load of local dignitaries. It was accompanied by another well loaded boat—50 feet in length which had been built by three local men in two days from the time the trees were growing in the forests near by. A "nine pounder" from the arsenal added to the tumult raised by pealing church bells and the cheering crowd as the *Enterprise* and *William Lehman*, both drawn by fine spans of horses, traveled four miles up the canal and back. Upon their return, they were greeted with a "National Salute" of 13 guns and the usual uncountable number of toasts.



Canal Terminus at Meadville

By 1831, however, the "bloom" was gone from the Meadville Canal. Loud, "important" voices from Pittsburgh had been heard in Harrisburg and the route of the northern canal to Lake Erie was shifted west from the Allegheny valley to that of the Beaver. This required through canal traffic from the east to Lake Erie to go through Pittsburgh, but it left the Meadville Canal somewhat isolated.

The Beaver Division, as that leg of that northern canal became known, was completed to five miles north of New Castle in 1834. That same year, Dec. 13, 1834, the Meadville Canal was completed to Conneaut Lake. In 1836 the Shenango Division was authorized to be run from the northern terminus of the Beaver Division to Conneaut Lake. In 1838 the Conneaut Division was authorized to take the canal the final 45 miles to Erie. The building of this latter division caused the Meadville Canal to be extended to unite with the main Beaver & Erie Canal near the line of Summit and Sadsbury townships.

The Conneaut Division was a long time being finished and the State grew weary of the expense. Therefore, in 1843, the entire Beaver & Erie project (including the French Creek Feeder) was sold to the Erie Canal Company, of Erie, Pa. So what had begun as an important segment of Pennsylvania's State canal to the Lake became part of a "feeder" to a private canal completed too late (1844) and too much lockage (71 locks on the Conneaut Division alone) to compete effectively with the onrushing railroads.

The Beaver & Erie Canal was purchased by the Erie & Pittsburgh R.R. (a subsidiary of the mighty Pennsylvania RR.) in 1870 and in 1871 it and the French Creek Feeder were closed for all time.



# PCS Fall Tour: D&H Gravity Railroad

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the Sunday Tour. Instead of Lock 36 as originally advertised, the Sunday Tour visited the Honesdale Fire Museum, Locks 22 & 23, and Lock House # 22, home of John and Cathy Frei. Stan Pratt gave us an excellent tour of the gorgeous Silsby Steam Fire Engine #483 first purchased in early 1875. This simple but very bright and shiny horse-drawn engine has been beautifully restored and is run several times a year. It's the oldest operable Silsby steamer in the United States.

Our last stop of the weekend was spent looking at Locks 22 & 23 near the "Narrows" of the Lackawaxen. The Frei's gave us a tour of the locks and the remains of the huge dry-stone wall built to contain the canal at this rocky outcropping that protruded into the river's path. We could only imagine what the much bigger portion of the wall was like before it was washed away in a flood. The Frei's gave us homemade cookies and a tour of their beautifully remodeled two-story lock house with walk-in basement and an amazing kitchen. It was a lovely way to end our weekend before we said goodbye.



Above: The last stop of the weekend took members to the "Narrows" of the Lackawaxen and the remains of the towpath wall by Lock 23.

Bottom left: Lock 22 at John and Cathy Frei's Lock House #22.

Bottom right: Lock 23 near the Narrows.

Photos by Doug Logan





**Delaware and Hudson Canal Company  
Gravity Railroad**

**Ladore Retreat and Conference Center**

**October 28 – 30, 2022**

**Pennsylvania Canal Society**

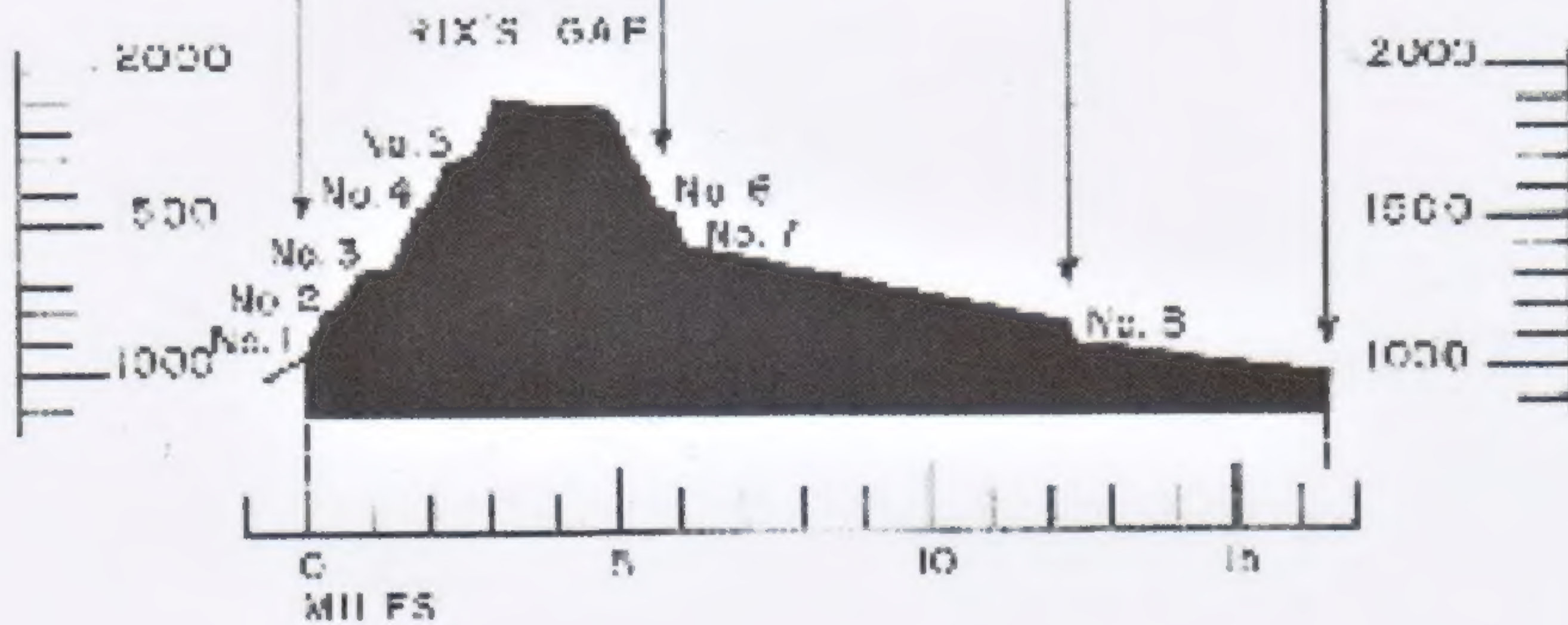
**Fall Tour**



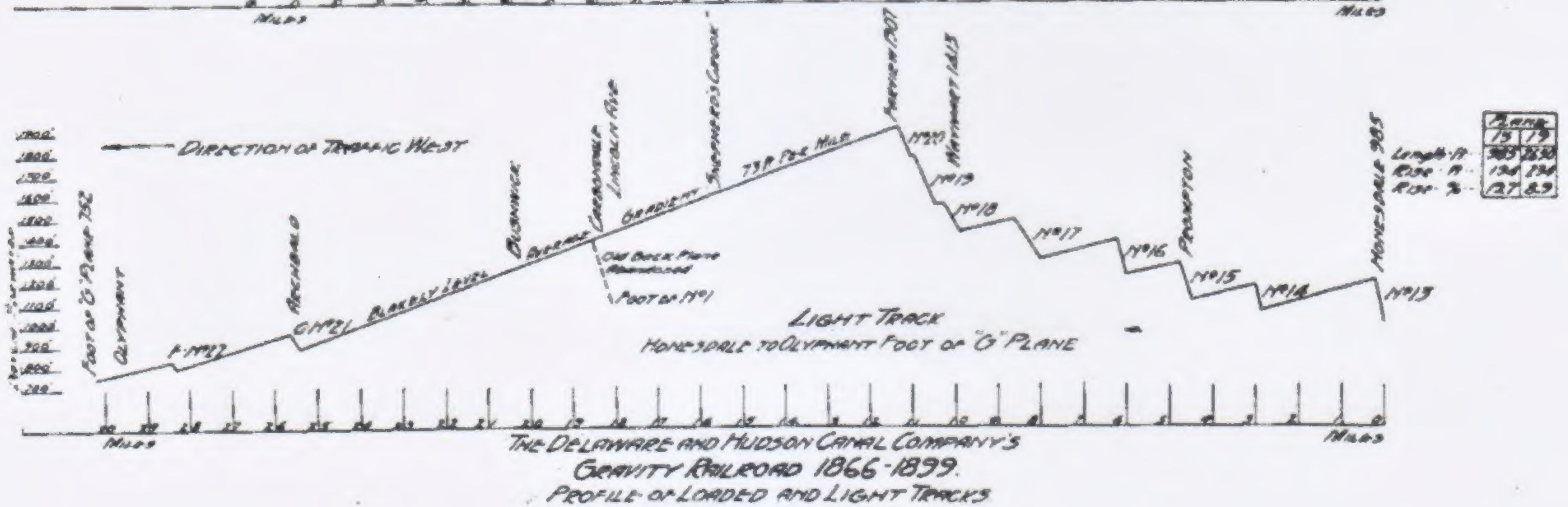
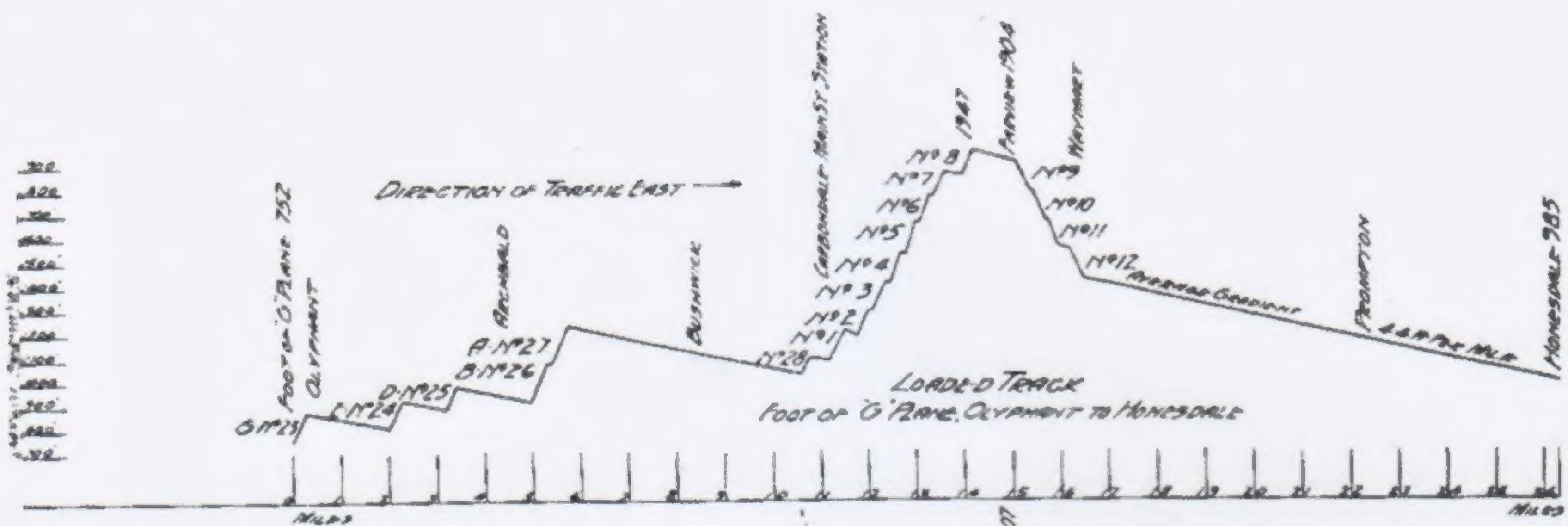


WAYMART  
CARBONDALE

HONESDALE  
PROMPTON



PROFILE  
ORIGINAL GRAVITY RAILROAD  
1829





# Delaware and Hudson Canal Company

## Gravity Railroad

Ladore Retreat and Conference Center

October 28 – 30, 2022

### Weekend Schedule

Friday October 28	3:00 - 5:00 PM	<b>Early Bird Tour</b> – Meet the van at Annex II where we will be staying. We will depart for a visit to D&H Lock 31 and tour the Daniels Farmhouse, circa 1820
	6:00 - 7:00 PM	<b>Dinner at the Lodge</b>
	7:30 - 8:30 PM	<b>Preview of Saturday Tour</b> by Dr. Robert Powell in Annex 2 Lounge
Saturday October 29	8:00 - 8:45 AM	<b>Breakfast at the Lodge</b>
	9:00 AM Sharp	<b>Saturday Tour</b> – Meet the van in the Lodge parking lot
	10:00 AM	Drive-by 1 <sup>st</sup> Anthracite deep mine, Gravity Park, and west side route
	11:00 AM	Visit to Gravity Depot in Waymart
	Noon	<b>Lunch at Ladore</b>
	1:00 PM	<b>Saturday Tour</b> – Continue to Plane No. 14
	2:00 PM	Leave for Wayne County Museum in Honesdale & Stourbridge Lion
	4:00 PM	Return to Ladore
	5:00 PM	<b>Dinner at the Lodge</b>
	6:30 – 6:45 PM	A short PCS Membership Meeting in Annex 2 Lounge
	7:00 – 8:00 PM	A presentation on the D&H Gravity RR by Dr. Robert Powell in Annex 2 Lounge
Sunday October 30	8:00 - 8:45 AM	<b>Breakfast at the Lodge</b>
	9:00 - 10:00 AM	Board Meeting in the Annex II Lounge – everyone is invited to attend
	10 AM - 1 PM	<b>Sunday Tour</b> - Meet in the van in the Lodge parking lot for a visit to Honesdale Fire Museum & World's oldest working steam fire engine & D&H Locks 22 - 23

**A big thanks** to Dr. S. Robert Powell, President of the Carbondale Historical Society, who is serving as our guide. He is also providing the preview on Friday evening and giving Saturday evening's presentation. Dr. Powell has 28 books on DVD about the D&H Gravity Railroad ([carbondalepahistorical.org/shop](http://carbondalepahistorical.org/shop)).

Also, a big **thank you** to Jane Varcoe, President of Waymart Historical Society; Scott and Paula Bennett, site owners of D&H Gravity Railroad Plane No. 14; Carol Dunn, Executive Director of Wayne County Historical Society, and John Frei, site owner of Locks 22 and 23.





**Carbondale from the top of Plane No. 28**





**Looking west from Moosic Mountains toward Carbondale from Plane No. 4**





**Shepherd's Crook light track heading down to Carbondale**



**Loading boats in Honesdale basin directly from gravity coal cars**





**Replica of the Stourbridge Lion built by D&H Shops in 1932**



**Lackawaxen Aqueduct designed and built by John A. Roebling**



# Delaware and Hudson Canal, 1829- 1898

## ◆ D&H Presidents

From *Delaware & Hudson* by Jim Shaughnessy  
(pages 3, 4, 6, 60, 61, 181, 201, 275, 351, 360, 369)

1	Philip Hone	1825 – 1826
2	John Bolton	1826 – 1831
3	John Wurts	1831 – 1858
4	George Talbot Olyphant	1858 - 1869
5	Thomas Dickson	1869 – 1884
6	Robert M. Olyphant	1884 – 1903
7	David Wilcox	1903 – 1907
8	Leonor F. Loree	1907 – 1938
9	Joseph H. Nuelle	1938 – 1954
10	William White	1954 – 1966
11	John P. Hiltz	1966
12	Frederic C. Dumaine	1967

## ◆ D&H 100th ANNIVERSARY

In autumn of 1998, the year marking the 100th anniversary of the last coal boat, Boat 1107, to travel the D&H, *Canal Currents* late editor William Dzombak put together Issue 113 dedicated to the D&H. Portions of the canal operated for several more years after 1898 but it marked the end for hauling coal. Newspaper articles from that issue are included here, in addition to articles written by **S. Robert Powell**, author and guide as well as presenter this weekend. The late Rider University Professor Albright “**Zip**” G. **Zimmerman** was president of PCS from 1996 to 2003 and contributed most of the articles in Issue 113. Mr. Dzombak introduced that issue:

*One hundred years ago, in 1898, the Delaware and Hudson Canal stopped operating. By then, railroad cars went directly to the coal mines, to be loaded there, and then transported the coal rapidly to markets that could not [be] served by the canal. Rail cars could be loaded and unloaded more quickly than canal boats. The*

*D&H system of transportation, with its dramatic but cumbersome gravity railroad, had served well in its day, but that era had come to an end.*

## ◆ D&H CANAL COMPANY INCORPORATED

May 3, 1823

The legislature of New York, at the late session, passed an act to incorporate a company, with a capital of \$500,000, to cut a canal from the Delaware to the Hudson, passing through parts of Sullivan, Orange, and Ulster counties. The immediate object is a supply of coal from the Lackawaxen mines in Pennsylvania, which are inexhaustible in quantity and easy of access. The country lying between the two rivers is said to be very favorable for the working of a canal to unite their waters, and the distance is not great.

—*Niles Weekly Register*

Contributed by A. Zimmerman

## ◆ PHILIP HONE LAUNCHES D&H CANAL

August 6, 1825

Companies have been formed and the stocks subscribed for making three canals between the Hudson and the Delaware: the Delaware and Raritan Canal by way of New Brunswick; the Morris Canal from the Passaic at Patterson to the mouth of the Lehigh, in the Delaware; the Hudson and Delaware Canal leading from the first-named river, not far from Kingston, to the Lackawaxen and the region of coal. The Delaware, above the Lackawaxen may be easily made navigable for one hundred miles. The ceremony of breaking ground for the last was performed, on the 13th ultimo, by Philip Hone, esq., of New York, president of the board of managers, on the summit level, in the midst of a great concourse of people assembled for the occasion, a full account of which we have on file and desire to give at some future day. Mr. Hone has thrown the weight of



his character and wealth into this undertaking, and it will be successful. The following extract from his address will be read with interest.

-----

In the present age of improvement, when the capital, the enterprise and the public spirit of the citizens of our happy republic are actively employed in developing its resources, unfolding its natural advantages, and rendering operative all the blessing with which a kind Providence has endowed it — undertakings like that which has been this day commenced, become matters of ordinary occurrence, and an enterprise which, a few years since, would, from its very magnitude, have been by some deemed chimerical, and the success of which would have been considered at least doubtful by all is now viewed with little interest, except by those immediately concerned in its accomplishment, and its projectors have less to hope from the applause which may crown their success than to fear from the odium which is a natural consequence of a failure.

The State of New York enjoys the pre-eminence of having first boldly taken up the line of march in the proud era of internal navigation. Our Schuylers and our Morrisses, who first conceived the noble project of uniting the great lakes and rivers with the ocean which bounds our territory, were not permitted to enjoy the successful accomplishment of their labors, but their precious legacy has been worthily improved by those to whom it descended, and the great design, opposed as it has been by the honest doubts of some and unworthy prejudices of others, has succeeded beyond the most sanguine expectations of those whose fame and reputation were identified with its success.

Our State owes an impayable debt of gratitude to the illustrious individual who is now at the head of its government and to his associates in the canal commission, for their unwearied exertions to carry into effect the measure adopted by successive legislatures, who, less sanguine than themselves, were still disposed to give every facility to their operations, and the successful completion of the great western and northern canals, while it attests to succeeding generations how much may be effected by public spirit and individual exertion, will serve to stimulate other

sections of our country to similar efforts in the great work of internal improvement.

The undertaking which has now been commenced does not claim an equal share of consideration with that to which I have just adverted, but, when viewed as the work of individuals, associated under the sanction of the state, but deriving no support from its funds, and when the great and important consequences which cannot fail to result from it are fairly considered, we feel assured that the public will give us the benefit of their good wishes, and contribute, at least, a friendly "God speed ye" to a work, which, if successful, must increase the prosperity and redound to the glory of the State. But, from you, citizens of Orange, Sullivan, and Ulster, we have a right to expect something more and, judging by the friendly co-operation and support which many of you have hitherto afforded us, we have no apprehension that our expectations will be disappointed.

We are preparing to open for you the means of communication with a sister State, rich in the production of the soil, and possessing an inexhaustible supply of coal, which, from its situation and the imperfect navigation of the rivers, is of little more value than the rich gems which "the dark, unfathomed caves of ocean bear". The products of your own farms and the timber of your own forests will also be increased in value, to an amount incalculable, by the facilities which will be afforded you of conveying them, with little labor and expense, to a market always calling for supplies and never supplied. But, in the prosecution of this work, we have many difficulties to encounter, many obstacles to remove and although, from recent experience, it has been found that the talents and industry of our countrymen are sufficient to overcome them all, yet we may be allowed to say, in the language of an accomplished orator of a sister State, who saw all the difficulties while he expatiated on the advantages of such an enterprise, "to accomplish all these objects, man raises the valley, levels the hill, diverts the stream, perforated the mountain, he leads the river in unaccustomed channels, and the bird of the air views the white sail of commerce usurping her accustomed haunts".



Several routes were surveyed and that which was adopted appears to have been selected after much consideration. Neither the length of the canal or its estimated cost is given in the address, which otherwise affords a pretty clear view of different routes proposed, but, in conclusion, Mr. Hone said:

Contracts have been entered into for excavation and locks on a considerable portion of the line, and the peaceful and beautiful valley, in which I have now the honor of addressing you, will soon be the scene of active and vigorous Operations. The hardy arm of labor, directed by science and professional experience, will be employed in rendering the bounteous gifts of nature subservient to the improvements of art. The citizens of our State and those of the State of Pennsylvania, will be convinced that the privileges granted by their respective legislatures are not intended to be merely employed as objects of interested speculation, and that the proud character which New York has obtained in works of internal improvement and public utility, is in no danger of being tarnished by the operations of the Delaware and Hudson Canal Company.

The ceremonies were concluded with dinner and the drinking of toast, among them the following:

The Delaware and Hudson Canal — Posterity will celebrate the anniversary of its commencement as a new era in the history of improvement.

The legislature of the State of New York — To whose liberality and enlightened policy the citizens of Orange, Sullivan, and Ulster, are indebted for the canal, the commencement of which we this day celebrate.

The State of Pennsylvania — Willing that the Delaware and Hudson shake hands, may she be as prosperous as she is great and magnanimous.

The cause of internal improvement throughout the Union.

The union of the States, cemented by works like this, it will be imperishable.

By John Sudam, esq., vice president: The president and orator of the day, his enlightened judgment has enabled him to appreciate the

advantages of the Delaware and Hudson Canal; his name has given to Ulster and Sullivan a strong arm in completing it.

[Mr. Hone here rose and thanked the company in a feeling and appropriate manner, for the honor this day conferred on him.]

By David Hunter, vice president: New York and Pennsylvania, twin sisters of the republic, may their common efforts produce internal wealth for themselves and external strength for their country.

By Charles H. Ruggles, esq., vice president: The health of a citizen of a sister state, Maurice Wurts, esq., whose mind first conceived the project of the Delaware and Hudson Canal, and whose ardor and perseverance has brought the work to an auspicious commencement.

—*Niles Register*

Contributed by A. Zimmerman

## **DELAWARE - HUDSON CANAL COMPLETED**

Feb. 21, 1829

The public seem scarcely aware that a canal, one hundred and six miles in length, commencing at the tide water near Kingston, and terminating at Honesdale in Pennsylvania, has been completed since July, 1825, and that this great work has been accomplished principally by the enterprise and perseverance of an individual company. As the channel for carrying coal to the navigable waters of the Hudson, this canal must be regarded as an improvement of incalculable importance to the public if not of indispensable necessity in supplying the exhaustion of fuel occasioned by the great increase of steam engines.

The first squadron of boats with coal arrived at tide water on the 5th instant. Fifty tons of this coal have been consigned to the Messrs. Townsends, which will afford our citizens an opportunity of testing its quality.

From some gentlemen who have recently been through on the whole line of the canal, we learn that the work has been executed in the most permanent manner, and that its construction, durability, and economy are judiciously



combined. This canal is 32 to 36 feet wide upon the water line and has four feet depth of water. The locks are 76 feet in length between the gates and nine feet wide. The boats are estimated to carry 25 to 30 tons. From the mouth of the Rondout, where it connects with the Hudson, to Port Jervis, near the Delaware River, is a distance of 59 miles; on this section are 60 lift locks and one guard lock, of hammered stone, laid with hydraulic cement. There are also one aqueduct over the Neversink River, 224 feet in length, upon stone piers and abutments; one over the Rondout, entirely of stone, upon two arches, one of 60 and the other of 50 feet chord; and ten others, of various dimensions, upon stone piers and abutments, over lateral streams; 15 culverts of stone, and 95 bridges having stone abutments and wing walls.

Port Jervis is less than a mile from Carpenter's Point, formed by the junction of the Neversink and Delaware rivers, and at which point the states of New York and New Jersey corner upon Pennsylvania. Port Jervis affords a View of the territory of three states, and also of the Delaware River and the fertile valley of the Neversink.

From this point, the line of the canal is carried along on the east side of the Delaware, to a point opposite the mouth of the Lackawaxen River. At this place, a dam has been erected across the Delaware, by means of which the canal is fed and boats cross the river. From McCarty's Point, which is formed by the junction of the Lackawaxen with the Delaware, the canal follows up the valley of the Lackawaxen, 25 miles, to the forks of the Dyberry, at which point the canal terminates, and where a thriving Village is already established, called Honesdale.

On the Delaware section, of 22 miles, there are 13 wooden locks, and on the Lackawaxen section, of 25 miles, are 37 locks of the same descriptions. These locks are secured by a substantial dry stone wall and so constructed that the wooden lining can be taken out and replaced without disturbing the rest of the lock.

Honesdale, where the canal terminates, is 16 miles distant from the coal region. Over these 16 miles, the coal is to be transported upon a rail road, which is already in great forwardness. The structure of the rail road is of timber, with iron

plates securely fastened to the timber rails with screws. The plates are estimated to weigh nearly 360 tons. The railway is furnished with five stationary and five locomotive steam engines. It is estimated that this rail road and its appendages will transport 540 tons per day, in one direction. The steam engines for the rail road were taken up as soon as the canal was navigable, and it is expected the rail road will be in operation as early as June next.

The rail road terminates at Carbondale, on the Lackawaxen River, where several hundred tons of coal have already been quarried, and transported to the canal by teams employed in conveying materials for the rail road.

The coal on the Lackawaxen has been tested and proves to be of the best quality for working iron, as well as for the ordinary purposes of fueling. As to quantity, there can be no reasonable doubt on the subject. A visit to Carbondale, and the coal region in its vicinity will satisfy any person that the supply is inexhaustible. And the canal being now completed, and the rail road nearly finished, our citizens in the cities and villages bordering upon the Hudson may congratulate themselves upon the facilities offered by this great highway for obtaining an inexhaustible supply of fuel.

*—Niles Weekly Register*

Contributed by A. Zimmerman

## ◆ FIRST RAILROAD LOCOMOTIVE IN AMERICA

New York City was supplied with anthracite coal by the Delaware and Hudson Canal Company. The name of that coal company reflects the fact that the coal was carried most of the way in canal boats that ran between the Delaware and Hudson rivers. Coal from the mines was loaded into canal boats at Honesdale; from Kingston, on the Hudson River, the canal boats were towed to New York City by steamboats. To carry the coal from the mines at Carbondale to the canal boat dock at Honesdale, a distance of seventeen miles across mountains, the D&H employed an unusual kind of railroad, called a gravity railroad. Inclined planes were



used to lower loaded coal cars down the side of each mountain [on the east side only, stationary steam engines were used on the west side]; the weight of the descending cars pulled empty cars up each of the inclines. Remarkable as that railroad was, the D&H line of transportation is perhaps better known as the place where the first steam locomotive was operated in America (1829).

The D&H gravity railroad line included about eleven miles of almost level grade between inclined planes. In 1827, chief engineer John Jervis suggested that steam locomotives be used to haul coal cars on the levels between planes. Horatio Allen, resident engineer of the D&H, went to England and ordered four locomotives that were named AMERICA, STOURBRIDGE LION, DELAWARE, and HUDSON. In May of 1829, the AMERICA and the STOURBRIDGE LION were loaded onto a Hudson River steamboat; at Rondout, the LION was transferred to a canal boat and carried to Honesdale. There is no record that the AMERICA ever arrived at Honesdale.

The LION was driven by two pistons, each with a stroke of three feet; grass-hopper walking beams transmitted steam power to the wheels. The LION was put to the test, on the D&H railroad at Honesdale, on August 8, 1829. Horatio Allen reported his experience as follows:

*The circumstances which led to my being left alone on the engine were these. The road had been built in the summer, the structure was of hemlock timber, and the rails of large dimensions notched on caps placed far apart. The timber had cracked and warped from exposure to the sun. After about 500 feet of straight line, the road crossed the Lackawaxen Creek on trestlework about 80 feet high and with a curve of 850 feet radius. The impression was very general that the iron monster would either break down the road or that it would leave the track at the curve and plunge into the creek. My reply to such apprehensions was that it was too late to consider the probabilities of such occurrences; that there was no other course but to have the trial made of the strange animal which had been brought here at such great expense, but that it was not necessary that more than one should be involved*

*in its fate; that I would take the first ride alone, and that the time would come when I should look back to this incident with great interest.*

*As I placed my hand on the throttle, I was undecided whether I should move slowly or with a fair degree of speed, but believing that the road would prove safe, and preferring, if we did go down, to do so handsomely and without any evidence of timidity, I started with considerable velocity, passed the curve over the creek safely, and was soon out of hearing of the cheers of the large assemblage present. At the end of two or three miles, I reversed the valve and returned without accident to the place of starting, having thus made the first railroad trip by locomotive on the Western hemisphere.*

That courageous demonstration proved to be in vain, because the LION was never used to haul coal on the D&H. The reason: the locomotive was too heavy for the tracks that had been laid on the line. The LION weighed seven tons, not the four or five tons that had been contemplated by Jervis and Allen when the locomotives were ordered. The LION was tested again, on September 9, 1829. That test prompted Jervis to report that *The result has led us to the conclusion that our curved road, with fifteen feet stretches will require additional support.... The locomotive will I think answer our expectations, when we get the road firm enough to bear it. So far, I think all the difficulties discovered can be remedied easily, though it must necessarily be at loss of time.*

The LION was taken off the tracks near the canal docks and left there to stand, neglected and exposed to the elements until, as winter approached, a rough wooden shed was built to cover the "monster". At night, vandals stripped pieces from the LION until, at last, the boiler alone was salvaged and taken to the D&H shop at Carbondale, where the boiler was used to supply steam for stationary engines in the shop. Years later, the remains of the LION were found in a scrap yard and removed to the Smithsonian Institution in Washington. Today, a replica of the STOURBRIDGE LION stands at Honesdale [in the Wayne County Historical Society Museum] to recall the event that made railroad history in America.



Wakefield, Manville B.  
*Coal Boats to Tidewater*  
and

*Scientific American Supplement*, February 10,  
1883, No. 371, p. 5912, supplied by A.  
Zimmerman

Contributed by William Dzombak

## ♦ JERVIS CORRESPONDENCE

The collection of the books and papers of John B. Jervis, preserved in his home town, Rome, New York, includes many letters that deal with the D&H system and the other projects that he worked on. Jervis, apparently, was reluctant to discard anything. Preserved are copies of letters that he wrote as well as letters that he received from others.

Here is how Jervis alerted Horatio Allen about the contemplated purchase of locomotives:

Dec. 15, 1827

*It is determined by the Board of Managers that you procure from England one locomotive engine with carriage complete for work. The 3 others that will be wanted is to depend on the cost at which they can be obtained, delivered at New York. It is supposed they can be obtained of American manufacture for \$1800 and I presume it will not be economy to purchase them from England at a greater cost unless you perceive a superiority in the workmanship of English engines, that in your opinion will justify the additional cost.*

On January 11, 1828, Jervis provided Horatio Allen with these instructions for the purchase of locomotives:

*If on six wheels, should weigh six to seven tons, preferably 6½. If on four; should weigh 5½ tons. J. would like six-wheeled engines if no trouble on curves. Speed should be 3½ to 5 miles per hour. Height of "chimney" not more than ten feet. J. wants four engines. These would cost about \$1800 in the U.S.*

President Bolton reported some promising news to Jervis, regarding the cost of imported iron:

April 30, 1828

*A bill has passed the Senate remitting all duty on iron and machinery or rail roads. Its fate is uncertain in the House of R., but one of the senators writes me that he is assured that it will be strongly supported in the House. This would be a windfall of at least \$8000 to us. Please mention this to Mr. Wurtz.*

A few weeks later, Bolton added these remarks:

May 9, 1828

*From Mr. Allen's quotations of prices of waggon wheels & axles, it appears to me that we shall find it most advantageous to get them made in this country unless a bill excepting railroad iron and machinery passes the House of Representatives & I have some fears that it will not pass, owing to the lateness of the session, as the iron makers will fight it hard.*

Regarding the setting of tolls for the transport of coal on the D&H, Jervis conveyed this opinion to President Bolton:

Dec. 25, 1828

*I am fully of the opinion that the interests of the company will be better consulted by encouraging a business, equal to the demand, than by obtaining a greater price for a less quantity.*

Where to put the locomotive engines to some use was the subject of a letter from Allen to Jervis:

June 22, 1829

*I agree with you in thinking it best to put the PRIDE OF NEWCASTLE on the summit plane and find that we must take it to pieces before we send it up...*

The arrival of locomotives was reported by Jervis to Bolton:

August 1, 1829

*The locomotives have been got out without any injury of consequence & we shall probably be able to make an experiment with the LION on Monday or Tuesday next. Let the rigging come up with the next locomotive, as it is difficult to find that here strong enough to work with safety.*



Jervis to President Bolton, regarding the first test of a locomotive on the D&H roadway:

August 6, 1829

*We have had the LION on the road from the basin to about half across the creek. At this point, one of the capts [capstans used to tow the locomotive, without steam in the engine] began to fail and we run her back a little. She stood on the road all right. Since that we have loaded a wagon to 6 tons inclusive & run her across the bridge & on to near the woods & back. By this we find it will be necessary to give additional support to our bridge work.... we have the necessary work in progress.*

A few days later, Jervis reported to Bolton:

Honesdale, August 8, 1829

*This morning we put steam on the locomotive for the first time... The locomotive will I think fully answer our expectations when we get the road firm enough to bear it.*

The beginning of operations on the D&H prompted President Bolton to remind Jervis of the importance of first impressions:

Sept. 19, 1829

*I now hope you will be able to commence a regular business next week. It is important to show, this fall, to our friends and enemies, what we can do — the friends of the Lehigh and Morris canal, and a host of others [who] take advantage of every opportunity to discredit our work. You see how sensitive some of the stockholders are, when so small a defect as that in the rail road, when compared with the magnitude of the work, caused a fall in the stock equal to \$150,000 on the whole.*

*The expenditures on the canal rail road and its appendages have much exceeded what I had estimate and the receipts from the coal business will not, to the extent anticipated, supply the funds. I therefore consider it very important that you should be able to show, to the numerous persons who intent to visit the work next month, as well as by the arrival of the coal here, that our work is not a visionary project.*

After it was found impossible to use the locomotives, Jervis said this to Leslie Combs:

Carbondale, December 13, 1830

*The distances for the use of locomotive engines are so short as to make it somewhat questionable whether anything will be attempted of this kind, until more experience is had on the subject & particularly in constructing engines of less weight than has hitherto been the practice.*

In a letter written by Jervis, at age 86, he said:

*Time does not count on the other side of the Great Divide, but the acts of this life still hold good as we sign off at the Terminal Station. I hope I will be called upon to face only green lights to the end, and by no acts of mine will any of my friends I leave behind have cause to regret they made my acquaintance.*

Kessler, William C.

The Private Library of John Bloomfield Jervis  
*Railway & Locomotive Historical Society Bulletin,*

No. 52 (May 1940), p. 41-47;

No. 53 (Oct. 1940), p. 11-18.

Contributed by A. Zimmerman

## ◆ D&H OPERATION SUCCESSFUL

Jan. 22, 1831

Among the documents which accompanied the message of the governor of New York, communicated to the legislature, there is a letter from the president of the Delaware and Hudson canal company. By which it appears that the canal will be 108 miles in length, connected by a railroad 16 miles long, in which distance an ascent of 855 feet, in a country thinly inhabited, is overcome. The latter, the letter states, is the first of its kind in this country. It requires all the combinations for ascending and descending planes, with engines worked by steam and gravity. The canal was opened on the 27th of April, and the work has thus far proved to have been substantially made.

The supplies of coal received through it are so extensive as to occasion a reduction of the price from \$8 per ton of 2,240 pounds, to \$6. The substitution of ropes for chains on the inclined planes of the rail road has been found to be



advantageous. The company have brought to market this year 41,000 tons of coal, all of first quality, except 1,500 tons of surface coal. The boats yet to arrive will increase the whole quantity to 43,400 tons. Last season, in the city of New York, foreign bituminous coal was \$12 per chaldron [32 bushels]; anthracite \$11 and \$11½ per ton. Foreign has recently been sold at \$6 50. Virginia coal is 25 per cent. less than last year. The dealers retail the company's coal at \$7½ including cartage, leaving \$6 75 as the price of the coal at the yard, or an advance of 75 cents on each ton. The first reduction in the price of wood, commenced in 1828, the first season of the navigation between the Hudson and Delaware, and is now cheaper than it has been for twenty years.

—Niles Weekly Register

Contributed by A. Zimmerman

◆ **D&H TRAFFIC REPORT, 1831**

Honesdale, June 11, 1831

Received at Honesdale by rail road from Carbondale, for the week ending this day, 720 rail road wagons containing 1,800 tons coal; a total received since 20th March, 21,600 tons.

Arrived from Honesdale from Bolton in the same, 92 boats with merchandise, &c. Cleared at Honesdale for Bolton, in the same time, 82 boats containing 2,295 tons coal.

July 2, 1831

The Delaware and Hudson Canal has far exceeded the hopes of its friends — 114 boats have passed in one week, with many rafts; 12,300 tons of coal have reached the Hudson, by the 14th May. Much merchandise is now passing into Pennsylvania by the canal.

—Niles Weekly Register

Contributed by A. Zimmerman

◆ **D&H COAL USED ON THE D&H**

July 2, 1831

Engines on the Delaware and Hudson Canal consume daily 1½ tons of refuse coal, with which

amount of fuel they are at present drawing 300 tons per day up inclined planes of 2,500 feet length and 210 perpendicular height, and there is not the least doubt but that one ton of good coal would do the same amount of work. Anthracite coal may therefore be safely calculated upon as being among the very best kinds of fuel for generating steam, uniting great heat with durability, and therefore particularly well adapted for locomotive engines, whose rapid motion creates draft enough to consume any quantity necessary to do the work required.

—Niles Weekly Register

Contributed by A. Zimmerman

◆ **D&H CANAL COMPANY REPORT, 1861**

The business of this company for the year ending March 1, 1861 was as follows:

Sales of coal .....	\$2,051,442
Canal and railroad tolls .....	397,041
Profits of barges, etc. ....	16,910
Coal on hand .....	248,321
	\$2,713,715

Preparations had been made for a large increase of production, and the operations of the Company were moving on steadily and satisfactorily until the 18th of June, when the work of mining was suddenly arrested by a general strike of the operatives. This strike continued for a longer or shorter period at the several openings, averaging, however, for the whole work a duration of sixty-eight days, in that portion of the season best adapted for full and economical work.[1]

The loss thus sustained, it will be readily seen, must have been very serious, but, large as it was, and great as must be the disappointment occasioned thereby, the Board can feel no doubt that it was a wiser policy to submit to the present sacrifice rather than by concessions to unreasonable demands, to lose that command of their own work which is essential to the permanent success of the Company. And while the Company, under its present management, will always aim to deal not only justly, but generously with those in its employ, it will resist to the end and at any cost, every attempt, by combinations



of workmen, to dictate the manner in which its business shall be conducted.

The canal was opened for navigation on the first day of May and closed by ice on the 18th of December. Not a single break occurred during the season, and the regular movement of boats was not at any time seriously interrupted. An extra-ordinary freshet occurred in the month of February, causing destruction of one of the reservoir dams near Honesdale. The injury to the Company's works was small and the accident will in no degree interfere with the resumption of work on the canal at the usual time.

The Board regret that they cannot yet announce the termination of the suit against the Pennsylvania Coal Company, for the sum claimed to be due for additional tolls in consequence of the enlargement of the canal. By an order of the court, the time for the taking of testimony has been limited, and it is believed that the case will be closed on both sides within a very short time and that a decision will be had in the course of the present season. The amount now claimed by this Company for "additional tolls" and exclusive of other demands, exceeds \$1,100,000.

The extension and other alterations in the Company's railroad, which have been in progress for some years, were completed and brought into use during the past season, and in the month of October, a committee appointed at the last annual meeting, visited the works, for the purpose of inspecting the improvements, and of observing generally the condition and management of the Company's property. They were accompanied by the President, and several of the managers, and on their return made a very gratifying report, a copy of which was sent to the stockholders.

The Weehawken Dock is now ready for partial use, and during the coming season it will no doubt afford very valuable facilities in enabling the Company to meet the demands of its customers in New York and in the eastern states. A considerable outlay is still required for the completion of this work, and it must be expected that there will be annually larger or smaller sums needed for construction purposes, so long as it is deemed advisable to provide for an increase of productive capacity. The Board, however,

believe that in future the sums required may be kept within the current income from the Company's business, and yet at the same time permitting a satisfactory return in dividends to the stockholders.

Arrangements have been made to bring to tide water not less than 700,000 tons, and if only the very low prices which have obtained for the last few years shall be realized in 1861, the result will not be likely to disappoint the reasonable expectations of the stockholders.■

The law suit mentioned in that report pertains to a business arrangement that was reported [2] as follows:

The Pennsylvania Coal Company is a consolidation of the Washington Coal Company and the Pennsylvania Coal Company. Each was chartered April 16, 1838, the former with authority to construct a railroad from the Delaware and Hudson Canal to the Wyoming coal mines, and the latter with authority to construct an extension to the North Branch Canal and the Susquehanna River. The act for the union of the two companies was passed April 12, 1849, and the consolidation consummated on the 16th of May following, the Pennsylvania Coal company assuming a contract made between the Wyoming Coal Association and the Delaware and Hudson Canal Company, dated August 31, 1847, for the perpetual use of one-half of the coal capacity of the canal, paying tolls therefore based upon the price of coal each year at the terminus of the canal on the Hudson River. Construction was commenced in November, 1847 and the road completed and brought into use in June, 1850.

The road of this company consists of two tracks, diverging in some parts nearly a mile from each other — the one track for the conveyance of coal and the other for the return of the empty cars. Each track is a series of inclined planes, the trains being drawn up the steep and short ones by stationary engines, and running down the long ones by their own gravity. The length of the road, from Port Griffith to Hawley, is 47 miles.■

[1] *American Railroad Journal*,  
Vol. XXIV (1861), p. 281-282.

[2] *Ibid.*, Vol. XXXIV (1861), p. 665.

Contributed by A. Zimmerman



# Waterpower on the D&H Gravity Railroad

By S. Robert Powell, Ph.D.

Water power was used on the inclined planes of the D&H Gravity Railroad in three areas: The light track from Honesdale to Waymart (Planes Nos. 14-17); Planes Nos. 1 and 28 in Carbondale; and Plane No. 21 in Archbald. The waterwheels on all of those planes, with the exception of one of the two wheels on "New Plane No. 28, which was an overshot wheel, were undershot wheels.

When the five inclined planes on the light track from Honesdale to Waymart were opened in 1843, four of them (Nos. 13, 15, 16, 17) had stationary steam engines at the heads of the planes and one of them (No. 14) had a water wheel at the foot of the plane. James Archbald's original plan was to have the engines on all five of these planes powered by water wheels, but water rights were either too expensive (Plane No. 13) or could not be obtained (Nos. 15, 16, 17).

James Archbald continued to advocate for waterwheels on Planes 13, 15, 16, and 17, and by 1848, three more of the planes (15, 16, and 17) were powered by waterwheels. A waterwheel was never installed on Plane No. 13 because water rights on that plane, said the D&H, were prohibitively expensive. In the period 1848-1868, the water wheels on Planes 14, 15, 16, and 17 (there were two waterwheels at the foot of Plane No. 17: an upper wheel and a lower wheel) were replaced, one by one, with stationary steam engines. The last of these planes to have its water wheel replaced with a stationary steam engine (built by the Dickson Works in Scranton and operated by Silas Hoyle as Head Engineer and Walter Bryant, Assistant) was No. 14, and that took place in 1868. (The source for our knowledge about the motive power on the planes on the light track from

Honesdale to Waymart in the early years of those planes is the February 1847 letter of James Archbald to D&H President John Wurts; also an article in the *Carbondale Advance* of February 8, 1868).

**Were did the water come from to power these planes?** D&H feeder ponds (e.g., White Oak Pond) and streams flowing down from high-lands to low-lands (e.g., the Van Tuyl brook), among many other feeder ponds and brooks near the D&H Gravity Railroad between Waymart and Honesdale. In recent years, most of those feeder ponds, which provided most of the water to power waterwheels at grist mills and saws mills for hundreds of years and which were built by knowledgeable farmers and lumbermen who knew how to build a dam that would last forever, have, regrettably, been drained, and the foundations of the dams blown up by imperfectly educated, selfish, or nefarious urban dwellers who have moved "to the country". The water from most of those feeder ponds and from small brooks originating on the Moosic Mountain (e.g., the Van Tuyl Brook) flowed into Stanton Pond (later known as Lake Lodore), and from there into the Van Auken Creek, which merges at Prompton with the West Branch of the Lackawaxen River (water from the Prompton Dam), which flows into Honesdale. After passing through Honesdale that same water powered the D&H canal locks from Honesdale to Hawley to the Lackawaxen River to the Delaware River.

In addition to the waterwheels on the light track between Honesdale and Waymart, there were also waterwheels on Planes No. 1 and 28 in downtown Carbondale, and on Plane No. 21 in Archbald.

**Planes Nos. 1 and 28 in downtown Carbondale:** The question of waterwheels and waterpower on the Gravity Railroad in



downtown Carbondale was raised initially in 1902 when, following the close of the Gravity Railroad and the removal, by the D&H bridge builders, of the "highworks" (Level No. 28 between the head of Plane No. 28 and the foot of Plane No. 1), workers discovered, as they were removing the abutments which supported those highworks and formed a wall for the embankment of culm, a giant waterwheel, made of oak and pine, that had been buried on the site where the D&H coal pockets at the foot of Salem Avenue would at that time be erected.

The discovery of this buried water wheel resulted in eight articles in Carbondale newspapers about the buried water wheel. (The complete texts of all of those articles are in the Gritman collection in the archives of the Carbondale Historical Society.) As a result of those eight articles, many "street-corner experts" came forward with various explanations about the buried water wheel. At the same time, fortunately, and authentic expert, William Johnson, Sr., who began working for the D&H in 1844 and who helped erect the buried waterwheel in question, came forward (*Carbondale Leader*, February 8, 1902, "A BUILDER SPEAKS ABOUT THE WHEELS...") We have read those eight articles, and here is what we have learned:

**Waterwheel on Plane No. 1:** When the Gravity Railroad opened in 1829, there was a large upright stationary steam engine at the head of Plane No. 1. In 1845 that upright engine was replaced by a pair of horizontal engines and a fifty-foot water wheel, which was operated by Eulis Campbell. This wheel was used only in the spring and fall of the year when there was an abundant supply of water available to power the wheel. This water was taken from the former Durfee saw mill pond on Canaan Street.

When the water wheel at the head of Plane No. 1 was no longer used, part of that wheel was used to make a book case that was owned by J. J. Alexander, in 1902. About the bookcase, J. M. Alexander reported: "It is made of good heavy oak and I think a great deal of it now. When Charles Wurts was going to leave town, I thought perhaps he might not want to take the case along, it was so heavy. That was about 1866, I had quite a number of books on hand and I asked Gus Wurts to go to his uncle and see if he couldn't get the bookcase. He succeeded in doing so for \$25, which I gladly gave, and the bookcase has been in my possession since." (That book case is now owned by the Mitchell Hose Company, Carbondale.)

**Waterwheels on Plane No. 28: "Old Plane No. 28" (1845/46-1853):** When the Gravity Railroad opened in 1829, Plane No. 28 did not exist. It was established in 1845/1846, and was powered by a waterwheel with water from the Carbondale Canal. The water for the Carbondale Canal came from two sources: the Lackawanna River and the Fall Brook. The raceway from the Lackawanna River went under the Van Bergen building, Dundaff Street, and then into the Carbondale Canal. The raceway from the Fall Brook ran from a dam just below the Fallbrook Falls and flowed west of present-day Fallbrook Street and then through Carbondale's West Side before it descended to the valley floor and entered, ultimately, the Carbondale Canal. Once under the D&H steam-line tracks, the Carbondale Canal flowed, generally, north-south through downtown Carbondale. In so doing it passed twice under the loaded track of the Gravity Railroad, twice under the D&H steam line tracks, and once under Eighth Avenue, before re-entering the Lackawanna River, in three different locations, in South Carbondale. Old Plane



No. 28 served up to 1853, when New Plane No. 28 was built.

**“New Plane No. 28 (1853-1859):** There were three waterwheels here: one in the period 1846-1853, and two (an overshot wheel, fifteen feet in diameter and ten feet abreast, and a second wheel, slightly smaller and geared to the other wheel) in the period 1853-1859. It was near “New Plane No. 28” that the coal pockets were later built, and where the buried waterwheel and wheelpit were found in 1902.

These water-powered planes on “old” and “new” Plane No 28 were used to transport coal to the foot of Plane No. 1 from (1) the newly opened mines in the Carbondale area (the Powderly mine, beginning in 1845; the Fall Brook mines, beginning in 1846), and (2) the mines in Archbald, the coal from which was now being shipped to Carbondale over the newly-established level from the top of the hill at Archbald to Plane No. 28 area in Carbondale.

**Waterwheel on Plane No. 21:** The third area of the Gravity Railroad where waterpower was used was in downtown Archbald, on Plane No. 21.

Plane No. 21, also known as C Plane, was the first of the south-bound planes between Archbald and Olyphant. When this plane was installed in 1859, the motive power on the plane was a waterwheel that was powered by a canal running from White Oak Run parallel to the Lackawanna River. In an article on the Gravity Railroad in Archbald that was published in the *Carbondale News* of January 10, 2001 (p. 7) we read: “The waterwheel at C Plane was powered by a canal which connected White Oak Creek to the Lackawanna River at a point where the

river bends at the base of C Bush [Plane No. 21].”

In 1865, this waterwheel at the foot of Plane No. 21 was replaced with a stationary steam engine at the head of the plane. At that time, the Canal was filled with earth, stone, and cinders. Later in the nineteenth century, tracks of the New York, Ontario and Western Railway were laid on the former D&H Canal basin in downtown Archbald.

Over the years, various persons with an interest in the D&H Gravity Railroad have made incorrect statements about the *terminus post quem* (beginning date) and the *terminus ante quem* (the closing date) of the use of waterpower on the D&H Gravity Railroad. The final word on the question of the final date is given in brief notice that was published in the *Carbondale Advance* of Saturday, February 8, 1868, p. 3, as follows: “The Del. & Hud. Canal Co. have just put a stationary steam engine in at Plane No. 14, on their railroad, in place of the old water power. The engine was built at the Dickson Works, Scranton, and has been placed in charge of Silas Hoyle as Head Engineer and Walter Bryant, Assistant. The company now work the cars on all their planes by steam power.—*Herald*” (*Carbondale Advance*, Saturday, February 8, 1868, p. 3.)

Summary statement on the question of waterwheels on D&H Gravity Railroad: In the period 1845-1868, Planes 1, 14, 15, 16, 17, 21, and 28, at various periods, as we have described above, were powered by water wheels.

\* \* \* \* \*



# **The Use of Inclined Planes on the D&H Gravity Railroad and Canal**

By S. Robert Powell, Ph.D.

The inclined plane is one of the six classical simple machines--lever, pulley, screw, inclined plane, wedge, wheel and axle--developed by man to facilitate the performance of work. Those machines, each of which uses a single applied force to do work against a single load force, are all mechanical devices that change the direction or magnitude of a force. One of those simple machines, the inclined plane, was integrated in the transportation system that was designed for the Delaware and Hudson Canal Company by both John Jervis (Gravity Railroad) and Benjamin Wright (D&H Canal).

An inclined plane is a simple machine that consists of a sloping surface connecting a lower elevation to a higher elevation. Using such a plane makes it easier/takes less force to move an object in an upward direction than it does to lift the object straight up, and this is because the inclined plane increases the distance that the object must be moved.

**Raising and Lowering Freight and Passenger Cars on the Gravity Railroad:** On the Gravity Railroad, the use of inclined planes has been well documented in the author's 24-volume series on the D&H, notably in Volumes I-VI. As is well known, loaded and light coal cars, freight cars, and passenger coaches were pulled up or lowered down inclined planes by stationary steam engines. When the Gravity line opened in 1829, most "cuts" of loaded coal cars that were pulled up the planes by stationary steam engines consisted of four cars, each of which contained five tons of coal. Ironically, the inclined planes on the Gravity Railroad, in fulfilling their mission, were used to make work against gravity easier.

On the levels between the planes, as constructed in 1829, horses pulled those same loaded and light coal cars, freight cars, and passenger coaches up very gently sloping inclined planes from the head of one plane to the foot of the next. Across Rix's Level/the Summit Level, 1829-1845, a horse could pull no more than two loaded coal cars, in each of which were five tons of coal. When the 1845 configuration of the line was installed, those same levels were all graded so that the loaded and light coal cars, freight cars, and passenger coaches moved by gravity down very gently sloping levels/inclined planes from the head of one plane to the foot of the next.

**Raising and Lowering Boats on a Canal:** Raising and lowering boats as they move through a canal, as all the world knows, is made possible by the locks in the canal. The "work" performed by the locks in a canal is wholly analogous to the "work" performed by the inclined planes, in the raising and lowering of passenger and freight vehicles on a railroad such as the D&H Gravity Railroad. The locks on a canal, in other words, function like inclined planes. The stretches of the canal between the locks, through which the canal boats are moved by mules or horses are, for all intents and purposes, true levels.

A loaded canal boat, headed for Rondout, for example, is moved into a canal lock and snubbed securely, and the gate at the rear of the canal boat is then closed. The paddle gate in the lock at the head of the canal boat is then opened, causing the water level in the lock to decrease. The canal boat, accordingly, is thus lowered to the level between the lock that the boat is passing



through and the next lock in the system. This lowering of a canal boat that takes place as the water in the lock is released through the lower paddle gate is analogous to the lowering of freight and passenger vehicles on the Gravity Railroad as they move down a plane.

Similarly, an empty canal boat, or any boat going up the canal, is moved into a lock and securely snubbed. The canal gate at the rear of the boat is then closed and the paddle gate at the head of the boat is opened, which raises the water level and the canal boat in the lock to the height of the level between the lock through which it is then passing and the next lock on the canal. This raising of a canal boat that takes place as the water in the level at the head of the canal boat enters the lock through the paddle gate at the head of the canal boat is analogous to the raising of freight and passenger vehicles on the Gravity Railroad as they move up a plane.



Shown here is a detail of the map of junction of the Lackawaxen River and the Delaware River (surveyed in 1854, map drawn in 1856 by E. W. Weston, Honesdale, and revised in 1865) on which are shown D&H Pennsylvania Lock No. 1, the Lackawaxen River, the location of the piers on both shores of the D&H rope ferry across the Delaware River, and the location of the Ferryman's House on the New York shore.

**Moving Canal Boats and Horses/Mules across the Delaware River:** The several histories of the Delaware and Hudson Canal now in existence note that, in the period 1828 to the opening of the Delaware Aqueduct in 1849, the boats on the D&H Canal were moved across the Delaware River at Lackawaxen by means of a rope ferry. How does a rope ferry function? An excellent description of how a rope ferry was operated in the nineteenth century is presented in James Otis' *Benjamin of Ohio, A Story of the Settlement of Marietta*. (James Otis Kaler, 1848 ?-1912, was an American journalist and author of children's literature, who wrote under the penname James Otis).

On pages 27-28 in the December 9, 2019 edition of *Benjamin of Ohio*, we read the following about a rope ferry on the Lehigh River:



“And so we journeyed on without adventure until we came to the Lehigh River, and there I saw what I dare say no fellow in Massachusetts has laid eyes upon. It was called a rope ferry, by means of which we were to cross the river [emphasis added].

“Ben Cushing claims that there is nothing wonderful about this ferry, for it consists simply of a rope stretched from one bank of the river to the other; to this, attached by a noose, or, in other words, a hawser [*Hawser* is a nautical term for a thick cable or rope used in mooring or towing a ship. A hawser passes through a *hawsehole*, also known as a *cat hole*, located on the *hawse*], which will readily slip, the ferryboat is made fast in such a manner that the stern is lower downstream than the bow, and the current catching this, forces the boat along.

“Perhaps I haven't made this very plain to you, but it is operated on the principle of force applied to what might be called an inclined plane [emphasis added]; therefore, since the craft cannot be shoved downstream by the current, it must be urged toward the opposite shore.”



Horses and wagons being moved across a river by means of a rope ferry.

What is known about the rope ferry on the D&H Canal and how it operated? In Manville B. Wakefield's *Coal Boats to Tidewater*, pp. 81-82, we read: “As the canal was originally built, the loaded boats drooped down through three locks, Nos. 3, 2 and 1 respectively, to the rope ferry crossing. On the New York side light boats moved out through a guard lock to the stilled pool of water above the dam [built in 1827 by the D&H across the Delaware River just below the confluence of the Lackawaxen and Delaware Rivers to create an area of still water for the floating across the Delaware River of canal boats]. [Wakefield then quotes John Willard Johnston, *Reminiscences and Descriptive Account of the Delaware Valley and Its Connections Aiming to Extend from Pond Eddy to Narrowsburg, 1900*] ‘A towpath was formed along the river edge [on the New York shore of the Delaware River] a distance of ½ mile. . . to a point



where a ferry was erected; by means of a pier stationed at the opposite side of the river composed of four foot square pine timbers locked together at the corners and the interior thoroughly filled with stones. The piers were twelve foot square at the base, about fifteen feet high and contracted to about seven foot square at the top. These piers supported the ends of a ferry rope two inches in diameter stretched across the river from pier to pier. By means of this rope a ferry scow [emphasis added] was guided across the river as occasion demanded.'(p. 37) /

“When the water was at low mark the boatmen [in exiting from Lock No. 1] would urge his horses to an extra burst of speed so as to establish sufficient headway to cause the boat to shoot across the river. This avoided the tedious process of being pulled across by rope. / ‘Many times the loaded boat crossing from the Pennsylvania side would pass over the river and enter the canal in New York before the horse and driver crossing by ferry would overtake it. When, however, the river was swollen by rains, the boats, horses, and all must be crossed by the ferry... Even this was possible only at certain levels of water above which boats could not cross at all and the business of the canal suspended for a time’ (*Johnston*, pp. 38-42) (end of Wakefield citation).



Shown here is the Independence Island Rope Ferry at Harrisburg, PA. This is the oldest rope ferry in the United States.

That material from *Wakefield* and *Johnston* is seconded by statements in Volume III of the eight volumes of testimony in the court case between the Pennsylvania Coal Company and the Delaware and Hudson Canal Company. Therein, on pages 1809-1904, the testimony by Peter P. Yapple is reported. Yapple was a boatman on the D&H Canal, who was 45 years old when he testified. He began working on the D&H Canal in 1833 as the captain of a boat. At the time of his testimony, he resided in the town of Rochester, Ulster County, NY. In that testimony, on p. 1834, we read the following:



Question by attorney: "In what manner were boats passed across the Delaware River before the [Delaware] aqueduct was built?" Yapple: "If the river was low, we would give headway to the boat with our horses, and shoot across it, as we call it; and take the horse in a scow and draw it over by a line or cable crossing the river; if the river was high we would run our boat to the scow, and take a line out on the scow and haul the boat over by hand." Attorney: "Do I understand you, in your preceding answers, to say that this process of crossing was prevented during time of severe freshets until the water should subside sufficiently?" Yapple: "Yes."

On this same question, we read, on page 443 in Volume I of the account of the PCC/D&H court case, the following statement by Russel F. Lord, who was the Superintendent of the D&H Canal: "...on the old canal [before the Lackawaxen and Delaware aqueducts were opened in 1849] the boats crossed the Delaware River in a pool created by the Delaware dam, using a rope ferry to transfer the horse from one side to the other; by the erection of the aqueduct, the boats now pass direct through it [Delaware aqueduct] over the river, and the horse on a towing-path on the side of the aqueduct."

Summary statements, based on the data presented above, on how D&H Canal Company boats and the horses that pulled those boats along the D&H Canal crossed the Delaware River at the rope ferry at the junction of the Lackawaxen and Delaware Rivers in the period 1829-1849:

**Crossing the Delaware River from the Pennsylvania shore to the New York shore of the Delaware River:** If the Delaware River was low, a D&H canal boat captain, in departing from Lock No.1, would give headway to his boat and shoot across the Delaware River. The horse or horses assigned to that boat would be transported across the Delaware River on a scow attached to the rope ferry. If the river was high, the canal boat would be moved across the Delaware River by means of the rope ferry; the horse associated with that boat would be taken across the Delaware by the scow on the rope ferry.

**Crossing the Delaware River from the New York shore of the Delaware River to the Pennsylvania shore of the Delaware River:** Canal boats, loaded and light, would be taken across the river by means of the rope ferry. The horses associated with those boats would be taken across the Delaware River on the scow that was part of the rope ferry system.

**Rope Ferries, Physics, and Geometry:** How does a rope ferry function? The rope ferry across the Delaware River, which used the power of the river to tack across the current, was what is known as a "reaction ferry", which is a cable ferry that uses the reaction of the current of a river against a fixed tether to propel the vessel across the water. Such ferries operate faster and more effectively in rivers with strong currents, such as the Delaware River. Reaction ferries are numerous at the present time in Germany and Poland.

Some reaction ferries, like the D&H rope ferry across the Delaware River, operated using an overhead cable suspended from towers anchored on either bank of the river. Other reaction ferries use a floating cable attached to a single anchorage that may be on one bank or mid-channel.

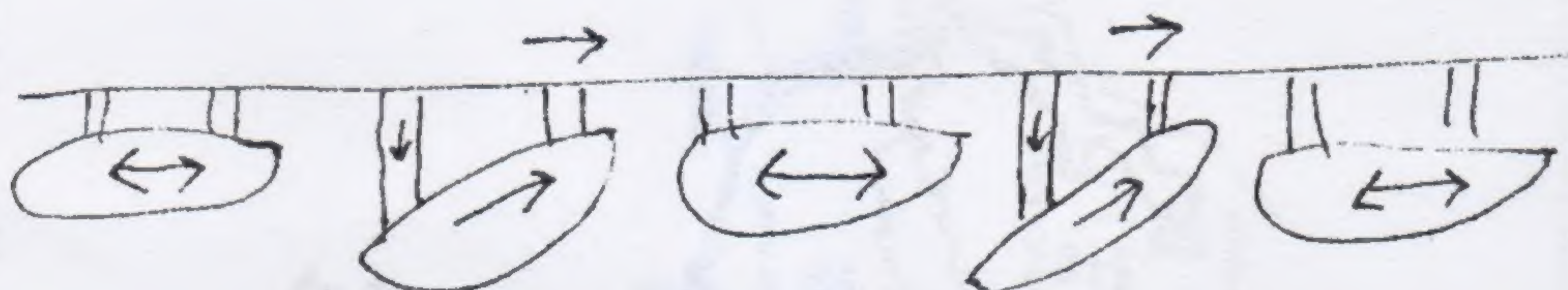


At the rope ferry pier on the Pennsylvania shore the Delaware River, two ropes (hawsers), both in the form of a noose, were hung on the rope across the Delaware River. These hawsers on the rope across the Delaware River were movable (they are sometimes called "travelers" on rope ferries) and could easily slip/move. The two hawsers were securely attached to the ferry scow (or to a canal boat), one at the bow and one at the stern. The two hawsers were not of equal length. The one at the bow was directly below the rope across the river (the shortest distance between the rope across the Delaware and the canal boat); the one at the stern was longer, perhaps by a third, than the hawser at the bow.

With the scow thus positioned at the pier on the Pennsylvania shore of the Delaware River, the down-river current of the river would push the stern down the river as far as the hawser at the stern would allow. This down-river force on the stern of the boat would cause the hawser at the bow of the boat to slide along the rope across the Delaware, in the direction of the New York shore. The forward motion of the boat would thus cause the stern of the boat to return to a position more or less under the rope across the Delaware. The river would again push the stern downstream, which would again cause the hawser at the bow of the boat to slide along the rope across the Delaware and guide the boat as it moved in the direction of the New York shore. A rhythm would quickly be established, as the canal boat, using the power/the current of the river, in a series of pulsing movements, tacked across the current and moved across the Delaware River.

The distance that the stern of a boat attached to a rope ferry is pushed downstream by the river (from its initial position directly under the rope across the river to the point where the hawser at the stern of the boat is fully extended) is completely analogous to the distance up or down which loaded and light coal cars or passenger cars were moved on a plane or level by a stationary steam engine on the Gravity Railroad. The current of the river (on the canal) and the stationary engines (on the railroad) are the sources of the power (work performed) that caused forward movement.

The distance between the position of a boat at the point of maximum extension of the hawser at the stern of the boat to the position of the boat at the point of minimum extension of the hawser at the stern of the boat (under the rope across the river) is wholly analogous to the length of a level on the Gravity Railroad. In geometrical terms, the shape of the movement of a canal boat across the Delaware River, by means of the D&H rope ferry, is, therefore, essentially triangular, as is the shape of an inclined plane or level on the Gravity Railroad.



Structurally, then, the D&H rope ferry can be seen as a series of nautical inclined planes by means of which canal boats (which carried from 30 to 50 tons of coal in the period from 1829, when the D&H Railroad and Canal became operational, to 1849, when the Roebling Delaware Aqueduct was put in service and the Rope Ferry across the Delaware River was no longer



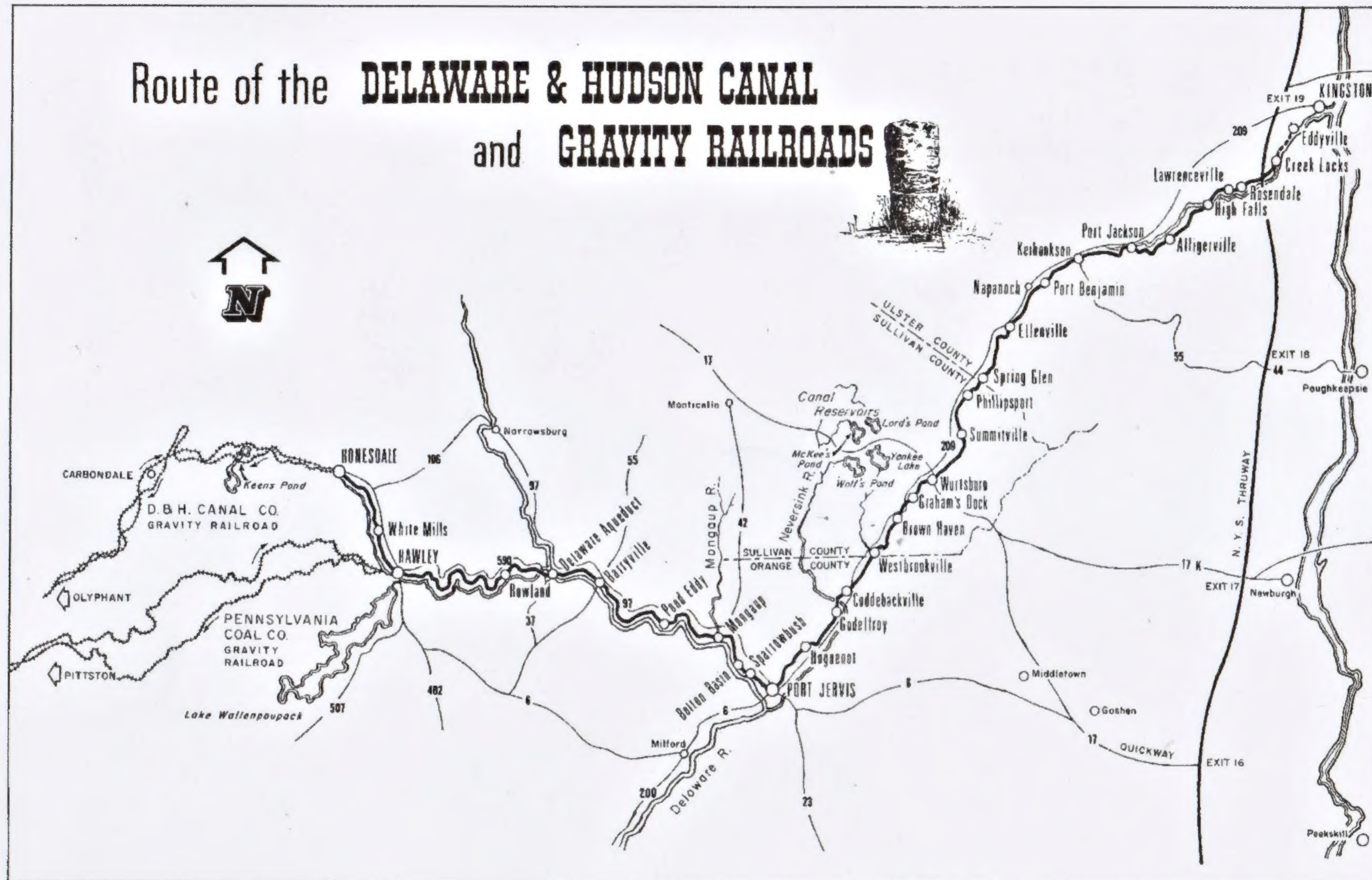
needed) and the rope ferry scow on the D&H Canal were moved across the Delaware River from the Pennsylvania shore of the Delaware River to the New York shore, and from the New York shore of the Delaware River to the Pennsylvania shore.

If John Jervis and Benjamin Wright, both of whom had engineering credentials of the highest order and who, therefore, understood the importance of using the classical simple machines that were developed by man to facilitate the performance of work, had not integrated one of those machines, the inclined plane, in the D&H Gravity Railroad and the D&H Canal, respectively, would the D&H have been able to accomplish, efficiently and in a cost-effective manner, the “work” that it did in the nineteenth century? Possibly, but it seems more than likely that they could not have done so. We’ll never know. One thing that we know for certain is that the D&H accomplished, efficiently and in a cost-effective manner, an astonishing quantity of “work” in the course of the nineteenth century. They did so by integrating in that transportation system that John Jervis and Benjamin Wright designed and which the D&H constructed from the Lackawanna Valley to Honesdale and from Honesdale to the Hudson River, a simple machine, the inclined plane.

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Map from *Coal Boats to Tidewater*, by Manville B. Wakefield.



